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ABSTRACT

This study used Washington state school district identification numbers to follow the progress of 14,860 fourth graders (in 1998) and 12,827 seventh graders (in 1998) for 3 years. The inauguration of the Washington Assessment of Student Learning (WASL) made it possible to track individual student academic performance and examine the consequences of early academic success. Through the use of creative flow analysis the study demonstrated the 3-year WASL results for students who initially scored at each of the four levels of the test. This resulted in the dramatic finding that only 3.1% of students who scored at Level 1 reading in grade 4 were able to meet the standard (Level 3 or 4) by seventh grade. This trend is confirmed for reading and mathematics for both the 4th to 7th grade cohorts and the 7th to 10th grade cohorts. The study also examined the impact of student background factors other than individual ability that might partially explain these findings. Ethnicity appears to be one such influence, although differences among ethnic categories may be at least partially due to differences in family income and other variables. Analysis also suggest that for every 100 students who score at level 1 in reading in grade 4 and proceed through the current educational system, approximately 34% will meet the reading standard at 10th grade. The report also contains recommendations that might guide remediation efforts, including a call to examine the nature of learning expected between fourth and seventh grades compared to that between the upper grades. (SLD)

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ED 479 541

Washington School Research Center

Research Report #1—April, 2002

The Power of Early Success

A Longitudinal Study of Student Performance on the Washington Assessment of Student Learning, 1998-2001

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The Power of Early Success

A Longitudinal Study of Student Performance on the Washington Assessment of Student Learning, 1998-2001

A Research Report From
The Washington School Research Center

Washington School Research Center

Forward

For the first time since the 1998 inauguration of the Washington Assessment of Student Learning (WASL) in Washington public schools, it is possible to track individual student academic performance over a three-year period. In this research report, Dr. Fouts uses the opportunity to analyze how students progress through the various scoring levels of the WASL, and in doing so, provides an astonishing view of the consequences of early academic success.

The study makes use of district identification numbers to follow the progress of 14,860 4th grade students (in 1998) and 12,827 7th grade students (in 1998) for three years. Through the use of a creative flow analysis, Dr. Fouts demonstrates the three-year WASL results for students who initially scored in each of the four levels of the test. This leads to the dramatic finding that "In total, of students who scored at Level 1 reading in 1998 (4th grade), only 3.1% of those students were able to meet the standard (Level 3 or Level 4) by 2001 (7th grade)." This trend is confirmed for reading and mathematics results for both 4th to 7th grade cohorts, and 7th to 10th grade cohorts, a powerful testament to the importance of early academic success.

The report goes on to examine the impact of student background factors other than individual ability that might partially explain these findings. Ethnicity appears to be one such influence. Dr. Fouts concludes, "The likelihood of a student moving out of Level 1 between 4th and 7th grades was greatest for Asian/Pacific Islander students and least for Black/African American students," a finding that also applied to 7th grade to 10th grade student progress. While similar analyses do not question the impact of ethnicity on student achievement, Dr. Fouts suggests caution over making simple conclusions. Through the use of additional student background data available from OSPI, he suggests that "differences among ethnic categories may be at least partially due to differences in family income and other variables."

Educators interested in school reform should note carefully Dr. Fouts' findings on the predicted progress of students from grade 4 to grade 10 on the WASL. The analyses revealed that, "for every 100 students who score at 4th grade Level 1 in reading and proceed through the *current* educational system, approximately 34%, or 34 of those students will meet the reading standard when they reach 10th grade." Chances for eventual success on the WASL are strongly impacted by ethnicity for students who initially score in Level 1, while the differences among ethnic groups are reduced for students scoring in the other levels. These findings are indeed sobering, especially if no efforts are begun to identify struggling students early and change the dynamics that lead to academic failure. As it is, however, "The current educational system does not appear to be serving these students adequately."

Dr. Fouts concludes the study by offering observations that might lead to remediation efforts, including a call to examine the nature of learning expected between 4th and 7th grades compared to that between 7th and 10th grades. To be sure, the overall implication of the study is that efforts be taken immediately to address the dynamics of academic

progress in the current educational system, and capitalize on the power of early academic success.

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Introduction

The Washington State Education Reform Act passed in 1993 required the identification of new student learning goals, new assessments of student learning, and a state accountability system for schools. The first task resulted in the identification of the Essential Academic Learning Requirements (EALRs) in the areas of mathematics, reading, writing, and listening. The Washington Assessment of Student Learning (WASL) was phased in at grades 4, 7, and 10 over a several year period to assess student mastery of the EALRs. In 1998 for the first time all 4th grade students and all 7th grade students were required to take the WASL. Those 4th and 7th grade students in 1998 were the first cohorts of students to take the WASL a second time in 2001 as 7th and 10th graders, respectively. This provides an opportunity to examine longitudinal student performance on the WASL—something that has not been possible until this year.

For the past several years, researchers at the Office of the Superintendent of Public Instruction and elsewhere have reported student WASL results on a year-to-year basis, a type of yearly "snapshot" of educational achievement. However, each year a different group of students is tested, and while these results are necessary and useful, it provides only a partial picture of student performance on the WASL. Because we now have a history of performance over time by the same students, we are able to examine student performance from a different perspective. In this research study we are focusing on the following questions:

1. How did students who took the 1998-4th grade reading and math WASL perform three years later on the 2001-7th Grade WASL?

2. How did students who took the 1998-7th grade reading and math WASL perform three years later on the 2001-10th Grade WASL?

3. Are there student factors that are related to student performance over time?

4. What percentage of students scoring at the various levels on the 1998-4th grade WASL is predicted to meet the WASL standard in the 10th grade in 2004?

Design of the Study

Databases

Student level databases from the Office of the Superintendent of Public Instruction (OSPI) were used to select the sample of students and for the data analyses. OSPI maintains WASL and Iowa Test of Basic Skills/Iowa Test of Educational Development (ITBS/ITED) student level files for each year. The files also contain district and school names and numbers, a student ethnicity variable, a student gender variable, and in some files a district-assigned student identification number. In addition,

the ITBS/ITED files contain student responses about views of school, amount of homework, and other related items. Prior to obtaining the OSPI files, student names were removed for confidentiality.

Scoring of the WASL

Raw test scores on the WASL are transformed to scale scores, which are interval in nature and allow for comparisons of scores along a continuum. Through a detailed standard-setting procedure, a "meets standard" criteria was established at a scale score of 400 (see Taylor, 2000a; 2000b; 2000c). Four categories were established representing various levels of achievement:

- Level 1—Below Standard, scale scores below 375
- Level 2—Below Standard, scale scores 375 to 399
- Level 3—Meets Standard, scale scores 400 to 421
- Level 4—Exceeds Standard, scale scores 422 and above.

Student files contain both scale scores and level scores. Each type of score is useful for analyzing student performance over time and for predicting future performance.

Samples of Students

In the state of Washington researchers are limited in their ability to conduct longitudinal studies of student achievement because of the lack of a common state student identification number. Matching student scores on a year-to-year basis or longer is difficult because of student movement from district to district and districts assigning a new identification number to each new student upon arrival. In addition, districts change their student identification numbering systems from time to time making it difficult to track a student even within a given district.

Therefore, lacking a state student identification number, including every student who took the WASL in 1998 and then again in 2001 in a longitudinal analysis is not possible at this time. However, working with the individual districts' student identification numbering systems we were able to match 14,860 1998-4th grade student WASL scores with their 2001-7th grade WASL scores, and 12,827 1998-7th grade student WASL scores with their 2001-10th grade WASL scores. This convenience sample of students came from 31 districts from around the state. The sample included only those students who were enrolled in the same district from 1998 to 2001, and is therefore not representative of students who changed districts during those years. Still, as is shown in Table 1, the two samples overall were very similar in scale score means to the entire population of students from which they were drawn. Both samples of students had somewhat fewer students at Level 1 for both reading and math than did the students in the state overall. The samples also included an overrepresentation of Black/African Americans and Asian/Pacific Islanders, with less Hispanics than the state overall.

Table 1. Sample Characteristics for 4th and 7th Grade Students in 1998

	State Average for 1998 4th Graders (N=76,071)	4th Grade Sample, 1998 (n=14,860)	State Average for 1998 7th Graders (N=76,908)	7th Grade Sample, 1998 (n=12,827)
WASL Reading Mean Scale Score	398	402	387	388
WASL Math Mean Scale Score	377	374	348	350
WASL Reading % of students				
Level 1	11.3%	7.4%	21.9%	14.3%
Level 2	34.2%	33.2%	40.6%	40.3%
Level 3	39.2%	41.6%	25.9%	30.4%
Level 4	15.3%	17.8%	11.6%	15.0%
WASL Math % of students				
Level 1	40.3%	34.1%	64.3%	54.4%
Level 2	29.1%	30.3%	16.1%	18.4%
Level 3	19.8%	22.1%	14.1%	18.4%
Level 4	10.8%	13.5%	5.5%	8.7%
Ethnicity % of students				
Am. Ind./Ala. Native	2.7%	1.9%	2.7%	1.7%
Asian/Pac.Isl.	6.9%	11.7%	7.0%	12.8%
Black/African Am.	4.9%	7.7%	4.5%	6.5%
Hispanic	8.8%	4.9%	7.9%	4.1%
White	74.3%	72.4%	76.1%	74.5%
Multi-racial	1.1%	0.8%	1.8%	.4%
Gender				
Male	51.2%	50.9%	51.4%	50.6%
Female	48.3%	49.1%	48.6%	49.4%

While the achievement levels of both samples in 1998 were comparable to the performance of the entire state, so too was their performance over the next three years. In 2001 the WASL test scores of the two samples generally reflected the slight differences from the state averages noticeable in the 1998 scores. If this was a random sample, these slight differences might be due to sampling error, a phenomenon present anytime samples are used. However, the slight differences in student achievement may also be due to the fact that the samples represent students who were continuously enrolled for a period of time as compared to students who changed districts. In any case, the samples and their

performance over this three-year period appear to be a fairly representative picture of the state as a whole.

Data Analyses

Once the samples of students were selected, correlations were calculated between students' 4th and 7th grade WASL scale scores and between students' 7th and 10th grade WASL scale scores. Crosstabulations were then calculated for each category (Levels 1-4) of students on the 4th grade WASL math and reading, with their level of performance on the 7th grade WASL math and reading. The same process was used for the sample of "7th to 10th" WASL students. Additional crosstabulations were conducted with the levels of the 2001-7th and 10th grade WASL results as the independent variable with the matched student responses to questions on the ITBS or ITED from the previous year. Finally, a model was developed to predict the percentage of students meeting standards on the 10th grade 2004 WASL.

Results

As expected, a student's performance on the 4th grade WASL was a moderately high predictor of his/her performance three years later on the 7th grade WASL. Both the 1998-2001 reading and the 1998-2001 math scale scores correlated significantly, $r = .69$. Similarly, the 1998-7th grade math scores correlated significantly with the 2001-10th grade math scores ($r = .71$) and the 1998-7th grade reading scores correlated significantly with the 2001-10th grade reading scores ($r = .64$). These findings confirm that later success in school is related to some degree on a student's achievement level early in school, and these statistics may be used to predict how any given student is likely to do on future tests. However, the scoring of the WASL provides the opportunity for a different type of analysis to bring more clarity to student performance and to identify which students are most successful over time in our educational system.

How did students who took the 1998-4th grade reading and math WASL perform three years later on the 2001-7th Grade WASL?

Crosstabulations were calculated for each category (Levels 1-4) of students on the 1998-4th grade WASL reading and math, with their level of performance on the 2001-7th grade WASL reading and math as the dependent variable respectively. The results of those analyses are shown graphically in Figures 1 and 2. The first column of the figures shows the reading levels and math levels for students based on their 1998 WASL results. The second column of the figures shows the percentages of students for each level from a given 1998 level of achievement. The third column shows the percentage of students from the 1998 level that met the reading or math standard (Level 3 or Level 4) in 2001.

Figure 1. Distribution of 4th Grade Students on the 7th Grade WASL—Reading

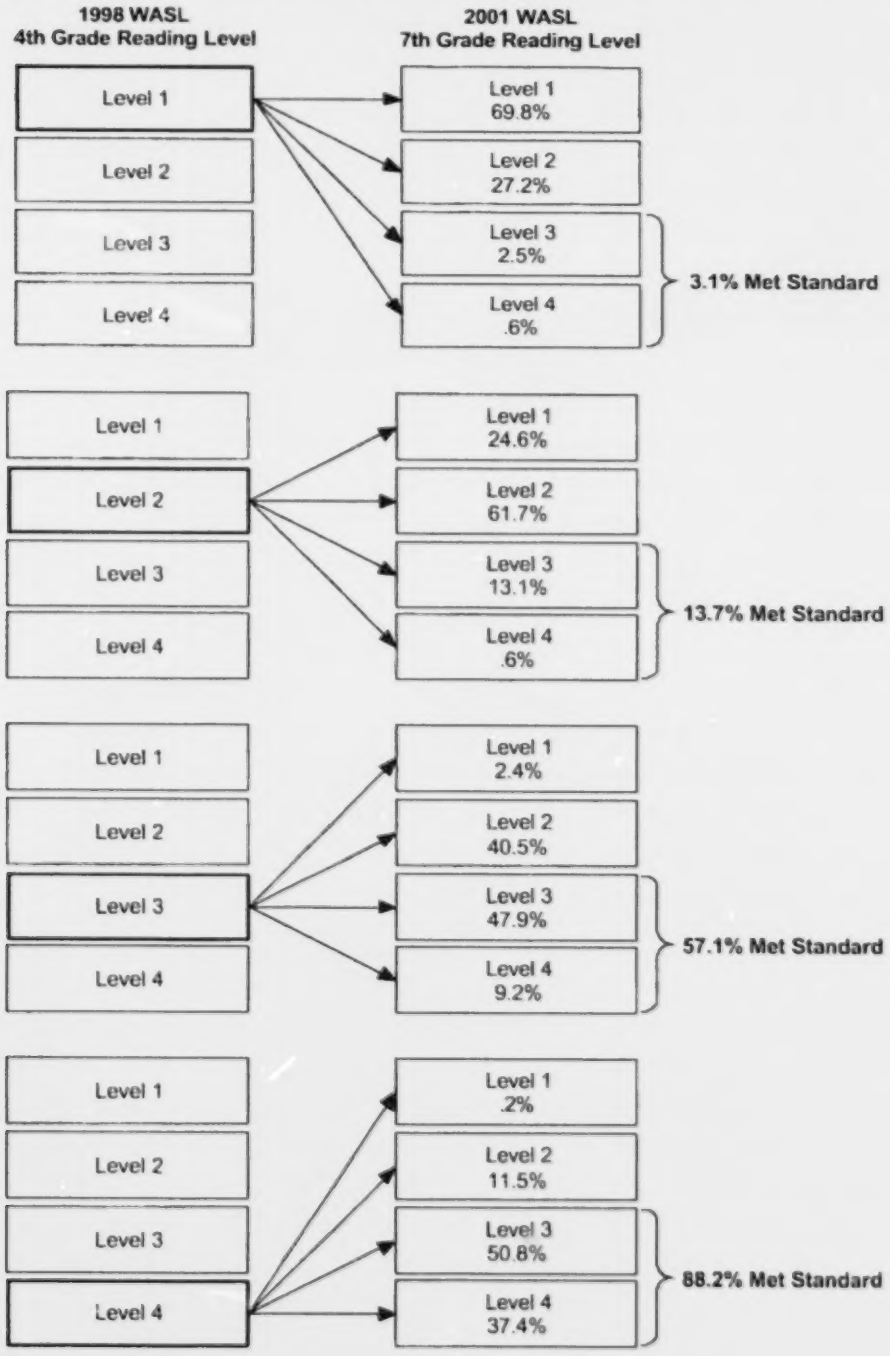

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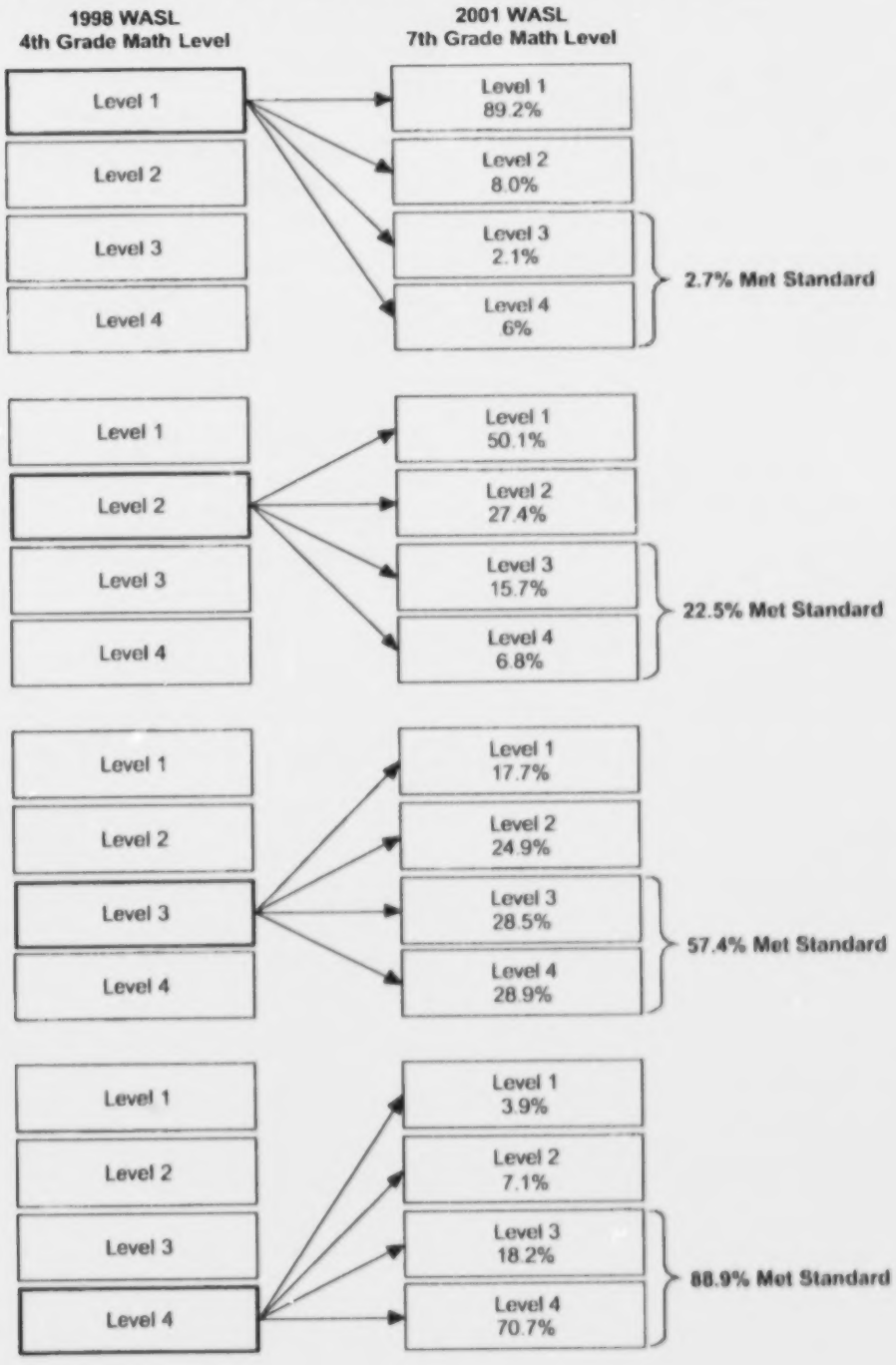
Figure 2. Distribution of 4th Grade Students on the 7th Grade WASL—Math



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The first section of the Figure 1 shows the distribution of 1998 reading Level 1 students on the 2001 WASL reading test. As the arrows indicate, 69.8% of the Level 1 students in 1998 (4th grade) remained at Level 1 reading in 2001 (7th grade); 27.2% of the Level 1 reading students in 1998 moved up to Level 2 reading in 2001; 2.5% of the Level 1 reading students had moved up to Level 3 reading in 2001; and only 0.6% of the of the Level 1 reading students had moved up to Level 4 reading in 2001. In total, of students who scored at Level 1 reading in 1998 (4th grade), only 3.1% of those students were able to meet the standard (Level 3 or Level 4) by 2001 (7th grade).

In contrast, students who achieved at Level 4 reading in 1998 (last section of Figure 1) were much more successful in meeting the 7th grade standard in 2001. Of these 4th grade students 88.2% met the 7th grade reading standard three years later, and only 11.5% had dropped off to Level 2 and 0.2% to Level 1.

The results for mathematics shown in Figure 2 are very similar to the reading results in Figure 1. Only 2.7% of the 1998 Level 1 students met the 7th grade standard in 2001; 22.5% of the 1998 Level 2 students met the 7th grade standard in 2001; 57.4% of the 1998 Level 3 students met the 7th grade standard in 2001; and 88.9% of the 1998 Level 4 students met the 7th grade standard in 2001. Another way of stating these results is that a student at Level 2 math in the 4th grade was 8.3 times more likely than was a Level 1 student to meet the 7th grade standard three years later (2.7% vs. 22.5%); a student at Level 3 math in the 4th grade was 21.3 times more likely than was a Level 1 student to meet the was 7th grade standard three years later; and a student at Level 4 math in the 4th grade was 32.9 times more likely than was a Level 1 student to meet the 7th grade standard three years later.

How did students who took the 1998-7th grade reading and math WASL perform three years later on the 2001-10th Grade WASL?

Similar crosstabulations were calculated for each category (Levels 1-4) of students on the 1998-7th grade WASL reading and math, with their level of performance on the 2001-10th grade WASL reading and math as the dependent variable respectively. The results of those analyses are shown graphically in Figures 3 and 4. The reading results in Figure 3 show that 20.2% of 1998 Level 1 students met the reading standard three years later in the 10th grade; 64.1% of 1998 Level 2 students met the reading standard three years later in the 10th grade; 92.9% of 1998 Level 3 students met the reading standard three years later in the 10th grade; and 98.1% of 1998 Level 4 students met the reading standard three years later in the 10th grade. The math results presented in Figure 4 show similar results with 19.5% of 1998 Level 1 students, 69.1%, of 1998 Level 2 students, 93.1% of 1998 Level 3 students, and 99.4% of 1998 Level 4 students having met the 2001-10th grade math standard three years later.

Figure 3. Distribution of 7th Grade Students on the 10th Grade WASL—Reading

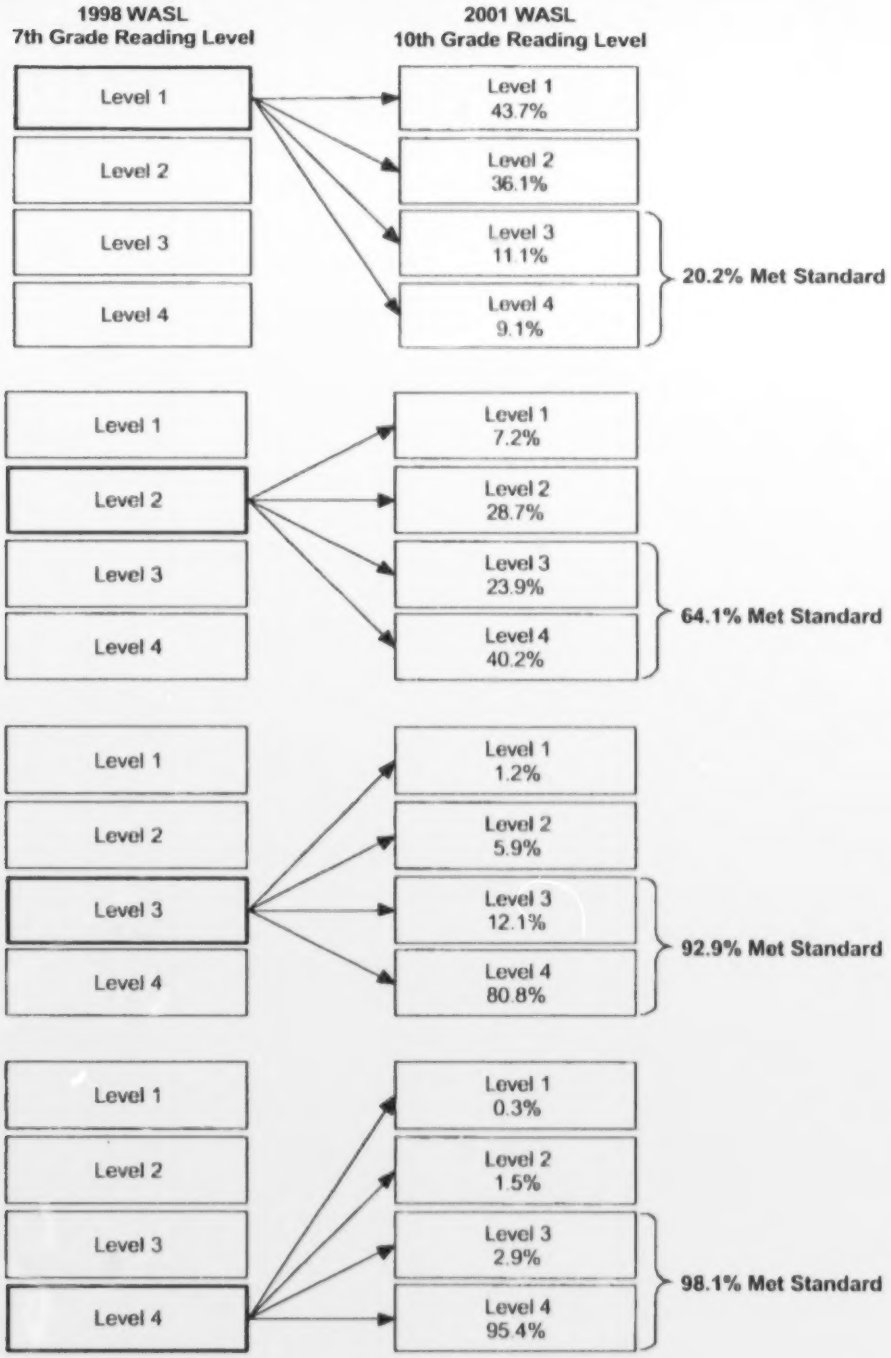

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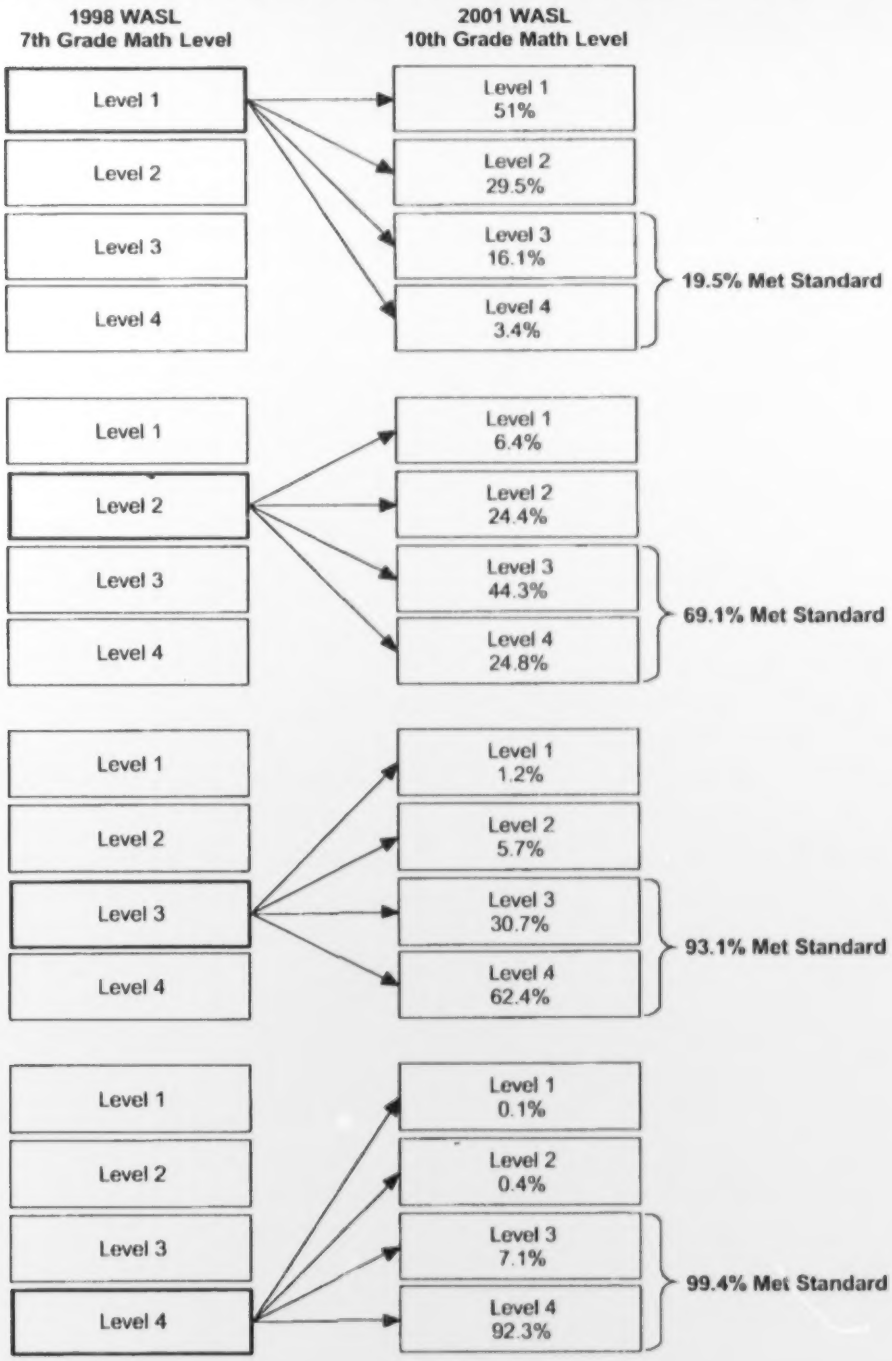
Figure 4. Distribution of 7th Grade Students on the 10th Grade WASL—Math



The 1998-7th grade Level 1 and Level 2 students experienced a much higher degree of success in meeting the 10th grade standards in 2001 than did the 1998-4th grade Level 1 and Level 2 students in meeting the 7th grade standards in 2001. For example, only 2.7% of the 4th grade math Level 1 students met the 7th grade standard three years later, while 19.5% of the 7th grade math Level 1 students met the 10th grade standard three years later. Similarly, only 13.7% of the 4th grade reading Level 2 students met the 7th grade standard three years later, while 64.1% of the 7th grade reading Level 2 students met the 10th grade standard three years later. Combined, 25.2% of 4th grade math Level 1 and Level 2 students met the standard three years later, while 88.6% of 7th grade math Level 1 and 2 students were able to do so.

These varying degrees of success are striking. While there may be a number of possible explanations, two are worth noting. First, these results suggest that the amount of learning expected between the 4th grade and the 7th grade, and between the 7th grade and the 10th grade are not equal. In other words, the amount of knowledge and skills expected to be mastered between the 4th grade and the 7th grade is much more than is expected to be mastered between the 7th grade and the 10th grade. A second possible explanation is that students are getting better preparation for the tests between grades 7 and 10 than between grades 4 and 7, thus leading to higher levels of student success. In any event, the different degrees of success are substantial and need further investigation.

Are there student factors that are related to student performance over time?

Student Ethnicity and Gender. The distribution of the 1998 cohorts of students by levels shown in Figures 1-4 are for all students in the aggregate and show that if a student achieved at Level 1 reading in 4th grade, there was a 69.8% chance that the student would be at Level 1 reading on the 2001-7th grade WASL. The data in Figure 2 show that if a student achieved at Level 1 math in 4th grade, there was an 89.2% chance that the student would be at Level 1 math on the 2001-7th grade WASL. Significantly lower percentages are noticeable in Figures 3 and 4 for 7th to 10th grade. However, when the data were disaggregated by ethnicity, the success rates differed among the groups and are shown in Table 2. The likelihood of a student moving out of Level 1 between 4th and 7th grades was greatest for Asian/Pacific Islander students and least for Black/African American students. The likelihood of a student moving out of Level 1 between 7th and 10th grades was greatest for Asian/Pacific Islander students and least for Black/African American and Hispanic students. These rates did not differ substantially for males or females.

These patterns of differences by ethnic group remained constant throughout the four scoring levels of the WASL, but were most pronounced at Level 1 shown in Table 2. The distribution differences among groups became smaller at Level 2 and Level 3 and were minimal at Level 4. For example, Black/African American students who scored at Level 1 in the 4th grade were likely to have less success on the 7th grade WASL than were White students who scored at Level 1 on the 4th grade test. However, Black/African

American students who scored at Level 4 in the 4th grade had future success rates on the 7th grade WASL similar to White students who scored at Level 4 on the 4th grade test.

One possible explanation for these findings could be found in the nature of the WASL scoring and the Level categories assigned to the scale scores. Student A with a scale score of 350 and Student B with a scale score of 374 would both be Level 1. However, to move out of Level 1 to Level 2 Student A would have much further to go than would Student B. If one ethnic group started out with scale scores significantly lower than another group, it could explain why one group was more successful in moving out of Level 1 over a three-year period. However, as the data indicate in Table 3, this was not the case. With the exception of 7th grade math, the scores across the groups were quite comparable. With approximately equal starting points, three years later some groups of students were much more likely to have moved out of Level 1 than were other groups.

Table 2. Level 1 to Level 1 Percentages for 4th to 7th and 7th to 10th Grades

4th Grade Reading to 7th Grade Reading

Percentage of students at Level 1 Reading in the 4th grade who are at Level 1 Reading 7th grade three years later if the students are:

Asian/Pac. Islander	58.7%
White	69.0%
Hispanic	70.1%
Black/African-American	82.1%

7th Grade Reading to 10th Grade Reading

Percentage of students at Level 1 Reading in the 7th grade who are at Level 1 Reading 10th grade three years later if the students are:

Asian/Pac. Islander	32.7%
White	40.9%
Hispanic	54.9%
Black/African-American	54.6%

4th Grade Math to 7th Grade Math

Percentage of students at Level 1 Math in the 4th grade who are at Level 1 Math 7th grade three years later if the students are:

Asian/Pac. Islander	88.8%
White	87.0%
Hispanic	93.3%
Black/African-American	95.3%

7th Grade Math to 10th Grade Math

Percentage of students at Level 1 Math in the 7th grade who are at Level 1 Math 10th grade three years later if the students are:

Asian/Pac. Islander	48.8%
White	46.9%
Hispanic	65.2%
Black/African-American	71.2%

Table 3. 1998 WASL Scale Scores for Level 1 Students

1998 4th Grade Reading		1998 7th Grade Reading	
Asian/Pac. Islander	356	Asian/Pac. Islander	356
White	354	White	355
Hispanic	350	Hispanic	355
Black/African-American	357	Black/African-American	355
1998 4th Grade Math		**1998 7th Grade Math**	
Asian/Pac. Islander	348	Asian/Pac. Islander	328
White	350	White	337
Hispanic	342	Hispanic	324
Black/African-American	346	Black/African-American	319

On the surface, these numbers suggest that ethnicity played an important factor in a student's chances of success on the WASL over time. However, research within the state of Washington at the *school* level has suggested that the relationship between student ethnicity and student achievement is strongly affected by family income (Abbott & Joireman, 2001). Therefore, looking at ethnicity as the only influential factor at the student level may be misleading. Since individual student family income level data are not available for Washington students it is important to examine other variables that may be related to family income.

ITBS/ITED Variables. The 14,860 matched 4th grade and 7th grade WASL student files were matched with the 6th grade ITBS file to provide three sets of data for each student:

- 1998-4th grade WASL scores and information;
- 2000-6th grade ITBS scores and information; and
- 2001-7th grade WASL scores and information.

The 12,827 matched 7th grade and 10th grade WASL student files were matched with the 9th grade ITED file to provide three sets of data for each student:

- 1998-7th grade WASL scores and information;
- 2000-9th grade ITED scores and information; and
- 2001-10th grade WASL scores and information.

Select questions on the 6th grade ITBS and 9th grade ITED tests provided data for identifying factors other than ethnicity related to achievement. The items asked for self-reporting on the part of students and included:

6th grade ITBS	9th grade ITED
Computer at home	Computer at home
Amount of time per week doing homework	Amount of time per week doing homework
Amount of time per day watching TV	Amount of time per day watching TV
How often student feels safe at school	How often student feels safe at school
How far student plans to go in school	How far student plans to go in school
	Mother's education
	Father's education
	# of school activities student participates in

Crosstabulations were calculated for each category of students (Reading Levels 1-4) on the 2001-7th grade WASL, with their responses the previous year to the 6th grade ITBS questions. The results by 7th grade reading levels are shown in Table 4. Crosstabulations were calculated for each category of students (Reading Levels 1-4) on the 2001-10th grade WASL, with their responses the previous year to the 9th grade ITED questions. The results by 10th grade reading levels are shown in Table 5.

Table 4. 6th Grade ITBS Variables by 7th Grade WASL Reading Level

Computer at Home

	Yes	No
Reading Level 1	73.6%	26.4%
Reading Level 2	85.4%	14.6%
Reading Level 3	92.9%	7.1%
Reading Level 4	95.7%	4.3%

Feel Safe at School

	Always	Most of time	Some of time	Never
Reading Level 1	34.5%	34.5%	23.7%	7.4%
Reading Level 2	34.7%	46.1%	15.6%	3.6%
Reading Level 3	41.3%	48.3%	9.0%	1.3%
Reading Level 4	45.9%	48.1%	5.3%	0.7%

Hours Per Week Doing Homework

	1 hr. or less	2-3 hrs.	4-6 hrs.	7 or more hrs.
Reading Level 1	25.4%	30.6%	37.3%	6.8%
Reading Level 2	14.3%	35.3%	40.1%	10.4%
Reading Level 3	7.8%	33.7%	43.0%	15.5%
Reading Level 4	4.9%	10.1%	41.7%	22.8%

Hours of TV Watched Per Day

	1 hr. or less	2 hrs.	3 hrs.	4 or more hrs.
Reading Level 1	24.3%	19.8%	19.2%	26.6%
Reading Level 2	26.3%	24.2%	21.4%	28.2%
Reading Level 3	36.5%	26.7%	20.0%	16.8%
Reading Level 4	49.0%	29.2%	13.6%	8.2%

Future Plans for School*

	Not finish high school	Graduate high school	Graduate from college	Attend graduate college
Reading Level 1	2.9%	11.0%	41.0%	21.0%
Reading Level 2	0.6%	4.7%	55.0%	22.0%
Reading Level 3	0.2%	1.4%	59.0%	30.0%
Reading Level 4	0.1%	0.7%	53.2%	42.3%

*Note: Total percents by reading level are less than 100% because of other possible responses.

Table 5. 9th Grade ITED Variables by 10th Grade WASL Reading Level

Computer at Home

	Yes	No
Reading Level 1	79.5%	20.5%
Reading Level 2	85.3%	14.7%
Reading Level 3	91.2%	8.8%
Reading Level 4	96.1%	3.9%

Feel Safe at School

	Always	Most of time	Some of time	Never
Reading Level 1	28.7%	34.6%	24.6%	11.1%
Reading Level 2	27.4%	47.3%	18.5%	6.8%
Reading Level 3	27.3%	53.1%	16.1%	3.5%
Reading Level 4	32.7%	56.4%	8.8%	2.1%

Hours Per Week Doing Homework

	1 hr. or less	2-3 hrs.	4-6 hrs.	7 or more hrs.
Reading Level 1	45.5%	34.9%	13.3%	6.3%
Reading Level 2	29.8%	35.6%	23.2%	11.4%
Reading Level 3	20.4%	36.1%	28.1%	15.4%
Reading Level 4	13.4%	25.7%	31.6%	29.5%

Hours of TV Watched Per Day

	1 hr. or less	2 hrs.	3 hrs.	4 or more hrs.
Reading Level 1	29.5%	22.1%	19.6%	28.8%
Reading Level 2	31.8%	23.8%	23.2%	21.2%
Reading Level 3	34.0%	26.2%	21.7%	18.1%
Reading Level 4	46.7%	25.6%	15.8%	11.9%

Mother's Educational Level*

	No H.S.	College Grad	Adv. College	Not Sure
Reading Level 1	14.5%	7.8%	4.1%	27.5%
Reading Level 2	10.4%	9.6%	5.8%	20.3%
Reading Level 3	8.6%	13.3%	7.8%	16.7%
Reading Level 4	4.3%	22.3%	13.5%	12.0%

Father's Educational Level*

	No H.S.	College Grad	Adv. College	Not Sure
Reading Level 1	12.2%	8.3%	4.8%	34.0%
Reading Level 2	9.2%	10.7%	7.1%	27.3%
Reading Level 3	6.5%	13.9%	10.6%	23.3%
Reading Level 4	4.4%	21.7%	19.7%	15.4%

Number of School Extra Curricular Activities

	0 Activities	1 Activity	2 Activities	3 Activities	4 or more Activities
Reading Level 1	33.0%	21.7%	19.1%	10.7%	15.6%
Reading Level 2	26.0%	22.4%	20.0%	11.8%	19.8%
Reading Level 3	20.0%	20.2%	21.4%	14.2%	24.3%
Reading Level 4	13.3%	17.6%	21.2%	15.7%	32.3%

Future Plans for School*

	Not finish high school	Graduate high school	Graduate from college	Attend graduate college
Reading Level 1	1.6%	14.3%	22.0%	11.2%
Reading Level 2	1.1%	7.5%	34.4%	14.5%
Reading Level 3	0.3%	3.1%	43.5%	19.2%
Reading Level 4	0.2%	1.1%	47.2%	34.3%

*Note: Total percents by reading level are less than 100% because of other possible responses.

Student success on the 7th grade WASL for the 4th-7th matched students was related to the five ITBS variables reported in the 6th grade. Successful students were more likely to have a computer at home, to feel safer at school, to spend substantially more time doing homework, to spend substantially less time watching TV, and to have more ambitious plans for further education. The results for 7th grade math levels followed the same patterns.

Student success on the 10th grade WASL was also related to the ITED variables, with similar patterns of responses to the 7th grade results. Successful 10th grade students were also more likely to have a computer at home, feel safe at school, report doing more homework and watching less television, and have more ambitious plans for future education. However, a larger percentage of 10th grade students at all levels reported doing one hour or less of homework each week than did 7th grade students, and a smaller percentage of 10th grade students planned to graduate from college than did 7th grade students.

Several of the ITBS/ITED variables suggest that differences among ethnic categories may be at least partially due to differences in family income or other variables. Level 1 students were least likely to have a computer at home, least likely to have a mother or father that has graduated from college or attended graduate school, and most likely to have a mother or father who did not complete high school, factors that suggest lower family incomes. Level 1 students were more likely to do little homework, to watch more television, and to not know the educational level of their mother or father. In Table 4 and Table 5 these patterns throughout the reading levels are quite clear. When ethnic categories were used to analyze the ITBS and ITED responses there were noticeable differences among the groups. For example, Black/African American and Hispanic students were less likely than were White students to have a computer at home (77%, 72% and 93% respectively), and less likely to have a mother or father who has graduated from college (17%, 15%, and 32% respectively). While the computer variable may be a reflection of family income, the college educated parent variable is generally thought to be a strong surrogate for family income. Combined, these variables suggest that there are economic differences among the groups. Likewise, students from some ethnic categories over-represented in the lower achievement levels also reported watching more television and doing less homework than other students. These findings suggest that, while student ethnicity may be an important factor, it alone cannot explain the differences in achievement among the groups (see the discussion of the research in this area in Abbott & Joireman, 2001.)

What percentage of students scoring at the various levels on the 4th grade WASL in 1998 is predicted to meet the WASL standard in the 10th grade in 2004?

Using the performance of the 1998 7th grade students on the 2001 10th grade WASL as a model, it is possible to predict how the 1998 4th grade students will perform when they take the 10th grade WASL in 2004. These predictions are based on certain assumptions that may or may not hold true over the next three years. For example, the

model assumes that there will be no future changes in the curriculum and instruction of the middle schools or high schools, assumes no more special intervention strategies for students who have not met the 7th grade standard, no enhanced accountability system, or no changing in the WASL scoring or standards. In other words, the model basically says: "If the middle and high schools provide the same types of educational services to these children over the next three years that they have provided to students over the last three years, here are the predicted results." Additionally, if we assume a static educational model at this point, that is with minimal changes from this point forward, it is possible from these two sets of three years of test results to predict the general outcomes from the model.

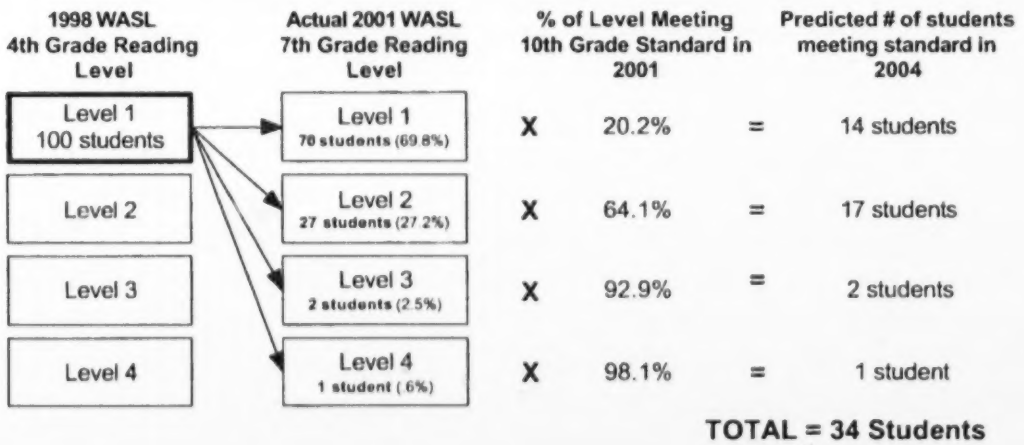
The students who took the 7th grade WASL in 2001 will take the 10th grade WASL in 2004. How those students were distributed by levels on the 7th grade tests is shown in Figures 1 and Figure 2. With a similar educational experience over the next three years as students received in grades 8, 9, and 10 in the previous three years, it is reasonable to expect a similar pattern. An output model for the current educational system for reading grades 4 through 10 is shown in Figure 5 and is based on the experience of the two cohorts of students over the previous three-year period (1998-2001).

The first column in Figure 5 represents the entry point of the model and is based on the students' 4th grade WASL reading results in 1998. Assume that 100 students score at Level 1 in the 4th grade. Based on the actual 1998-2001 results (Figure 1) these students went on to score at Levels 1 through 4 at the percentages and numbers of students shown in the second column in Figure 5 (*Actual 2001 WASL 7 Grade Reading Level).* Based on the actual success of the 7th grade students by level in 1998 at meeting standards in 2001 (Figure 3 far right hand column), we can predict the approximate percentage of 2001-7th grade students by level that will meet the 10th grade standards in 2004. These percentages are shown in the third column of Figure 5 (*% of Level Meeting 10th Grade Standard in 2001*). The last column in Figure 5 is the predicted number of students meeting reading standard by level, and the total number of students predicted to meet standards out of the 100 students who scored at Level 1 in 4th grade.

The data in Figure 5 show that for every 100 students who score at 4th grade Level 1 in reading and proceed through the *current* educational system, approximately 34%, or 34 of those students will meet the reading standard when they reach 10th grade. For every 100 students who score at 4th grade Level 2 in reading and proceed through the *current* educational system, approximately 58 of those students will meet the reading standard when they reach 10th grade. This means that there is a 1.67 times *greater* chance of a 4th grade Level 2 student meeting the standard in the 10th grade than for a 4th grade Level 1 student. A 4th grade Level 3 student has a 2.38 times greater chance of meeting the standard in the 10th grade than does a 4th grade Level 1 student. A 4th grade Level 4 student has a 2.68 times greater chance of meeting the standard in the 10th grade than does a 4th grade Level 1 student.

A second model can be created with WASL math as the outcome. For every 100 students at 4th grade Level 1, approximately 25 of those students will meet the 10th grade standard; for every 100 students at 4th grade Level 2, approximately 51 of those students will meet the 10th grade standard; for every 100 students at 4th grade Level 3, approximately 77 of those students will meet the 10th grade standard; and for every 100 students at 4th grade Level 4, approximately 93 of those students will meet the 10th grade standard. Level 2, Level 3, and Level 4 students at the 4th grade are 2.04, 3.08, and 3.72 times, respectively, more likely to reach the 10th grade standard than are 4th grade Level 1 students.

Figure 5. Output Model for Current Educational System—WASL Reading


1998 WASL 4th Grade Reading Level
Actual 2001 WASL 7th Grade Reading Level
% of Level Meeting 10th Grade Standard in 2001
Predicted # of students meeting standard in 2004
Level 1 100 students
Level 2
Level 3
Level 4
Level 1 70 students (69.8%)
Level 2 27 students (27.2%)
Level 3 2 students (2.5%)
Level 4 1 student (.6%)
X 20.2% = 14 students
X 64.1% = 17 students
X 92.9% = 2 students
X 98.1% = 1 student
TOTAL = 34 Students

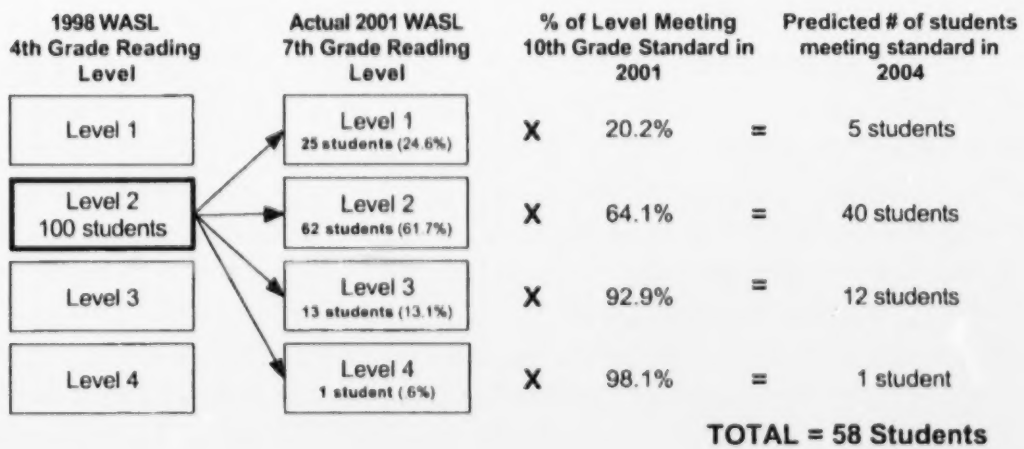

1998 WASL 4th Grade Reading Level
Actual 2001 WASL 7th Grade Reading Level
% of Level Meeting 10th Grade Standard in 2001
Predicted # of students meeting standard in 2004
Level 1
Level 2 100 students
Level 3
Level 4
Level 1 25 students (24.6%)
Level 2 62 students (61.7%)
Level 3 13 students (13.1%)
Level 4 1 student (.6%)
X 20.2% = 5 students
X 64.1% = 40 students
X 92.9% = 12 students
X 98.1% = 1 student
TOTAL = 58 Students

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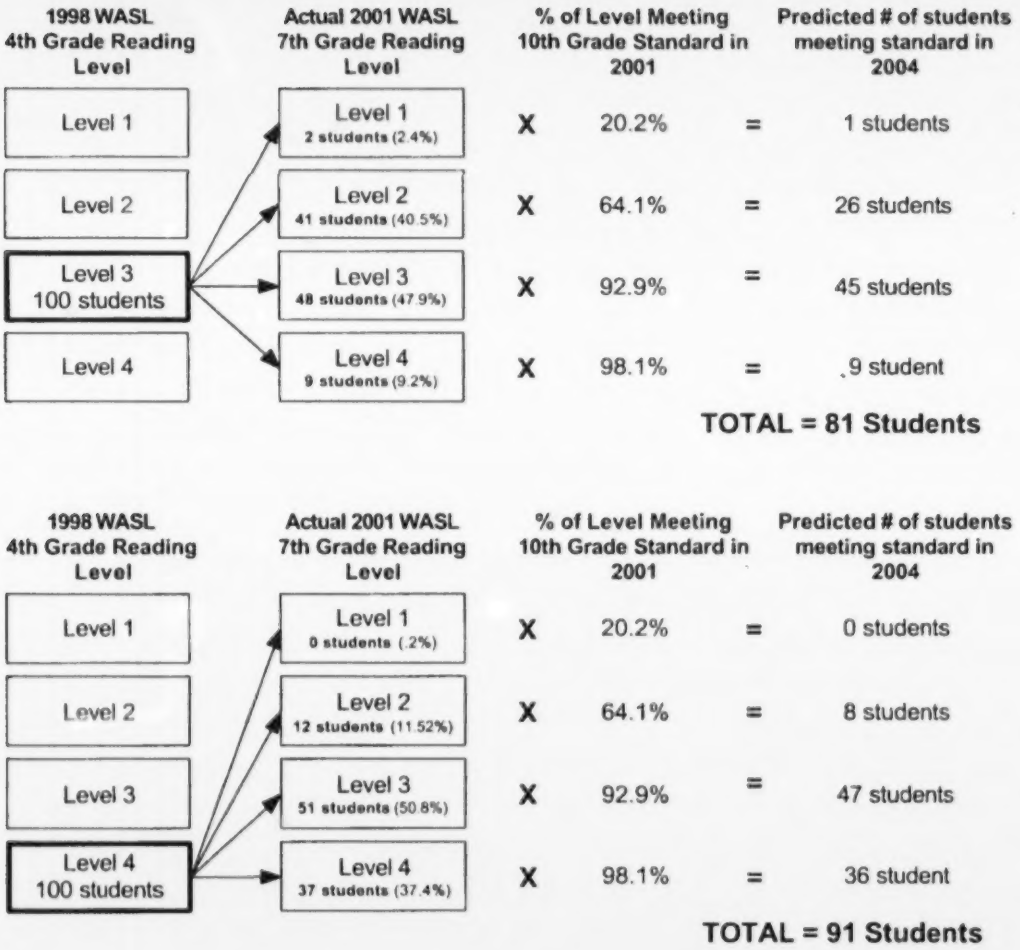
Figure 5 (cont.)



The percentage of students predicted to meet 10th grade WASL standards based on 4th grade WASL reading and math levels for each group of students based on ethnicity is shown in Table 6. Asian/Pacific Islander 4th grade Level 1 students, as a group, are predicted to be the most successful Level 1 students in both math and reading, and Black/African American 4th grade Level 1 students are predicted to be the least successful in both reading and math under the current educational system. While, overall, 4th grade Level 1 students' chances are substantially reduced compared to other students, Black/African American and Hispanic 4th grade Level 1 students' chances are considerably lower in spite of the fact that the groups had comparable scale scores for the Level 1 students in the 4th grade (see Table 3). However, if these students are in Level 2, 3 or 4 in the 4th grade, the differences among the ethnic groups are reduced accordingly.

It is important to note that the observable ethnic categories also represent other factors thought to influence student achievement apart from ethnicity (see Tables 4 and 5).

Table 6. Percentage of Students Predicted to Meet 10th Grade WASL Standards Based on 4th Grade Reading and Math Levels.

If a student is at this 4th *Grade Reading Level* . . .		% of students predicted *to meet 10th Grade* Reading Standard	If a student is at this 4th *Grade Math Level* . . .		% of students predicted *to meet 10th Grade* Math Standard
Level 1	All Students	34%	Level 1	All Students	25%
If that student is . . .			If that student is . . .		
	Asian/Pac.Isl.	47%		Asian/Pac.Isl.	30%
	White	36%		White	28%
	Hispanic	24%		Hispanic	17%
	Black/Afr. Am.	20%		Black/Afr. Am.	13%
Level 2	All Students	58%	Level 2	All Students	51%
If that student is . . .			If that student is . . .		
	Asian/Pac.Isl.	67%		Asian/Pac.Isl.	53%
	White	60%		White	52%
	Hispanic	46%		Hispanic	43%
	Black/Afr. Am.	40%		Black/Afr. Am.	40%
Level 3	All Students	81%	Level 3	All Students	77%
If that student is . . .			If that student is . . .		
	Asian/Pac.Isl.	85%		Asian/Pac.Isl.	79%
	White	81%		White	77%
	Hispanic	72%		Hispanic	70%
	Black/Afr. Am.	68%		Black/Afr. Am.	70%
Level 4	All Students	91%	Level 4	All Students	93%
If that student is . . .			If that student is . . .		
	Asian/Pac.Isl.	95%		Asian/Pac.Isl.	95%
	White	92%		White	95%
	Hispanic	88%		Hispanic	89%
	Black/Afr. Am.	86%		Black/Afr. Am.	91%

Summary and Conclusions

Student level databases from the Office of the Superintendent of Public Instruction (OSPI) were used to identify a convenience sample of students for longitudinal analyses. Using district student identification numbers 14,860 4th grade students from 1998 were matched with their 2001-7th grade WASL scores, and 12,827 7th grade students in 1998 were matched with their 2001-10th grade WASL scores. In addition, these students were also matched with their 6th and 9th grade ITBS/ITED test results respectively, to provide information on other variables of interest. The two samples of students came from 31 districts from around the state and included only those students who were enrolled in the same district from 1998 to 2001. The two samples were similar in achievement levels to the entire population of students in the state and included an overrepresentation of Black/African Americans and Asian/Pacific Islanders, and an under representation of Hispanics than the state overall. An insufficient number of American Indian/Alaska Native students prevented that category from being included in a number of analyses.

Tracking student performance from 1998 to 2001 revealed that, as would be expected, early success in school as measured by the WASL was a predictor of success three years later. However, tracking students by level provided a striking contrast between those students who were at Level 1 and those students that were at Level 4 in the 4th grade. A 4th grade Level 4 reading student was 28 times more likely to have met the reading standard three years later than was a 4th Grade Level 1 reading student, and a 4th Grade Level 4 math student was 33 times more likely to have met the math standard three years later than was a 4th Grade Level 1 math student. These analyses also show that a very large percentage of students at Level 1 in the 4th grade were still at Level 1 three years later, thus greatly reducing the probability that they will meet the 10th grade standards. The probability for future success was further reduced if a student was Hispanic or Black/African-American. These different rates of success were not nearly as dramatic from 7th grade to 10th grade, but nonetheless, the differences between the success rates by level were substantial. From these sets of analyses, a predictive model was constructed that shows the importance of early success on the WASL for long-term success in high school.

While the WASL results show differing success rates by student ethnic categories, the matched ITBS/ITED variables suggest that, while ethnicity may play a factor, other factors may also be at work to influence student success rates. For example, there was a clear pattern between the 7th grade WASL levels and the likelihood of having a computer at home, the amount of homework students report doing, and the amount of television watched each day. These findings suggest that other variables, such as family economics are important considerations. In fact, analyses of the ITBS/ITED questions by ethnic categories did show differences among the groups on these potential explanatory variables.

Actual student performance from 1998 to 2001 and the predictive model graphically demonstrate, once again, the importance of early success in school. On the positive side, there were fewer 4th grade Level 1 students in 2001 than in 1998. However, there are still substantial numbers at Level 1. Providing early academic services to these students will greatly enhance their chances of later success. The current educational system does not appear to be serving these students adequately. This is particularly important if passing the 10th grade WASL is required for high school graduation.

The varying degrees of success between the "4th-7th" students and the "7th-10th" students at meeting the reading and math standards in 2001 suggest that, among other things, the amount of learning expected between the 4th and 7th grades and between the 7th and 10th grades is not equal. If this is a desired feature of the WASL, then adjusting the criteria used to establish the "meets standard" may be in order by either reducing the expectations at the 7th grade level, or by increasing the expectations at the 10th grade level.

The implementation of a state student identification number will allow additional and more thorough studies on student performance. The sample of students in this study represents only those students who have been continuously enrolled in a district for three years. With a state identification system researchers will be able to track students throughout the state and to determine the effects of student mobility on student achievement and school performance. It will also allow researchers to conduct studies similar to this one to identify those schools and programs that are dealing effectively with difficult to educate students.

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